

PATENT SPECIFICATION (11)

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1 497 133

(54) STUD WELDING TOOL

(71) We, HILTI AKTIENGESellschaft, a Corporation organised and existing under the laws of the Principality of Liechtenstein, of Schaan, Liechtenstein, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a stud welding tool having a stud holder which serves to hold studs prior to and during the welding operation and which is provided with elongate slots.

Known stud welding tools have stud holders whose receivers are slotted in the axial direction beginning from the front end thereof. By providing these slots, the stud holder is subdivided into radially expansible fingers. These fingers are inherently resilient; however, it is also known to increase the resilience of the individual fingers by providing special means. In this connection it is known to arrange spring rings or sleeves, or rings made of elastic material, around the exterior of the stud holder.

Each stud to be welded is introduced into the stud holder, between the radially expansible fingers, prior to the welding operation. Then, the inserted stud is held against falling out of the holder, prior to and during the welding operation, by the resilient gripping force applied thereto by the fingers. In addition, the fingers serve as contacts for transmitting welding current to the stud.

As is well known, upon performance of the welding operation, a succession of particles, composed of impurities and/or liquid metal, are thrown off from the surface of the workpiece to which the stud is being welded. Some of these thrown-off particles encounter the front end of the stud holder. Accordingly, the particles can get into the slots, so that after a certain time, so severe a coating accumulates that satisfactory re-

silience of the individual fingers (and thus adequate retention of the studs as well as adequate electrical contact) is no longer afforded. Resort to the known expedient of providing, around the stud holder, a sleeve which projects partly in front of the forward end of the stud holder, does not satisfactorily counteract this disadvantage, since it has been found that even the slightest gap permits the passage of the particles and leads to the formation of a coating, as aforesaid.

An object of the invention is to provide a stud welding tool whose stud holder is so protected against fouling that optimum retaining forces for the studs are guaranteed in all conditions of use.

With this object in view, the present invention provides a stud welding tool having a stud holder which serves to hold studs prior to and during the welding operation and which has elongate slots therein, characterised in that the elongate slots are occupied by an elastic filler.

This filler in the elongate slots in the tool of the invention makes impossible any penetration by impurities or metal particles thrown off from the workpiece. Moreover, the filler imposes a guiding force onto the fingers of the stud holder, so that the entire stud holder is reinforced and in this way is less susceptible to damage, such as may arise, for example, from oblique withdrawal of the welding gun from the welded-on stud. With a filler which adheres sufficiently to the flanks of the slots, additionally the inherent resilience of the individual fingers of the stud holder is substantially improved.

Preferably the filler is natural rubber or a synthetic rubber; for example butyl rubber, butadiene acrylonitrile rubber, rubber-like interpolymers which contain vinyl groups, silicone rubber, or chloroprene, vulcanised in place.

In order to supplement the resilience of the stud holder, the arrangement may be

such that the stud holder is surrounded, in jacket fashion by the natural rubber or synthetic rubber. This jacket additionally protects the inherently sensitive fingers of the stud holder against external influences, for example against damage to the welding tool by dropping.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a side elevation of a welding tool having a stud holder in accordance with the invention;

Fig. 1a is an enlarged section taken along the line 1a—1a of Fig. 1;

Fig. 2 is a part-sectional elevation of the stud holder of a second embodiment of the welding gun in accordance with the invention, to an enlarged scale; and

Fig. 2a is a section taken along the line 11a—11a of Fig. 2.

Referring firstly to Figs. 1 and 1a of the drawings, the stud welding tool illustrated therein, designated as a whole by the numeral 1, comprises a handle 2 on which is a trigger mechanism 3 actuation of which serves to initiate each welding operation. The muzzle region of the welding tool 1 is provided with a stud holder which is designated as a whole by the reference numeral 4. Furthermore, bearing feet 5, 6 are also arranged in the muzzle region of the welding tool 1. The number of the bearing feet (two in the present instance) is unimportant and can be selected as described in accordance with the intended practical environment of use of the tool.

As shown more especially in Fig. 1a, the stud holder 4 is provided with elongate axially-directed slots 7, so that the front end of the holder 4 is formed by inherently-resilient fingers 7a. These slots 7 are occupied by elastic filler 8, conveniently vulcanised in place.

Figs. 2 and 2a illustrate an arrangement having a stud holder which is designated as a whole by the numeral 4a, Fig. 2 being a sectional view which is substantially enlarged in comparison with Fig. 1. Beginning at the forward end 4b thereof, the stud holder 4a has (for example) three elongate axially-directed slots 7. The number of these slots 7 can be selected as desired, dependent upon both the nature of the

material of the stud holder 4a and the dimensions of the same. What is decisive is that the slots 7 should provide for the fingers to be sufficiently resilient still being sufficiently rigid to ensure reliable gripping of the welding studs. The sectional view of Fig. 2 has been taken in a direction such that two of the slots 7 are evident, the one slot 7 being shown in elevation and the other in section.

Evident more especially from Fig. 2a is filler 8 which occupies and fills the slots 7 and which surrounds the stud holder 4 in jacket fashion and which is made of natural or synthetic rubber. This filler can, as shown by way of example by Fig. 2, terminate at its forward front end 4b flush with the front end of the stud holder 4a, or it may project beyond the forward front end of the stud holder 4a, so as to form a collar as a stop for defining the depth of insertion of studs to be welded.

WHAT WE CLAIM IS:—

1. A stud welding tool having a stud holder which serves to hold studs prior to and during the welding operation and which has elongate slots therein, characterised in that the elongate slots are occupied by an elastic filler.

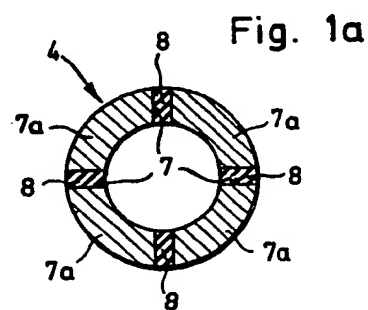
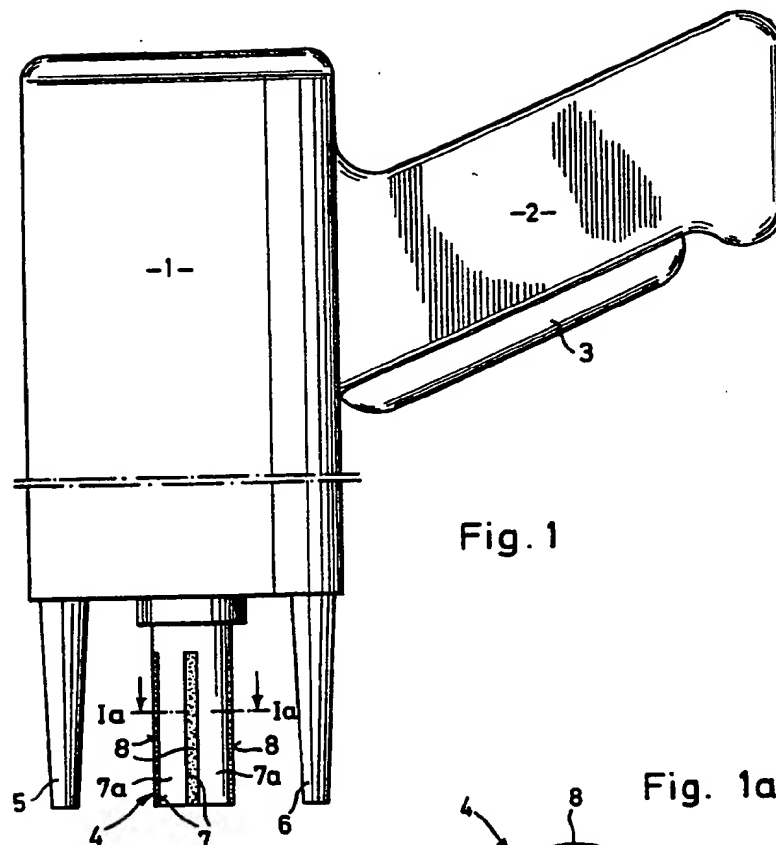
2. A stud welding tool as claimed in Claim 1, characterised in that the filler is natural rubber or a synthetic rubber.

3. A stud welding tool as claimed in Claim 2, characterised in that the stud holder is surrounded in jacket fashion by the natural rubber or synthetic rubber.

4. A stud welding tool as claimed in Claim 2 or 3, characterised in that the elastic filler is vulcanised in place.

5. A stud welding tool substantially as hereinbefore described with reference to and as illustrated in Figs. 1 and 1a or in Figs. 2 and 2a of the accompanying drawings.

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COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale*

Sheet 2

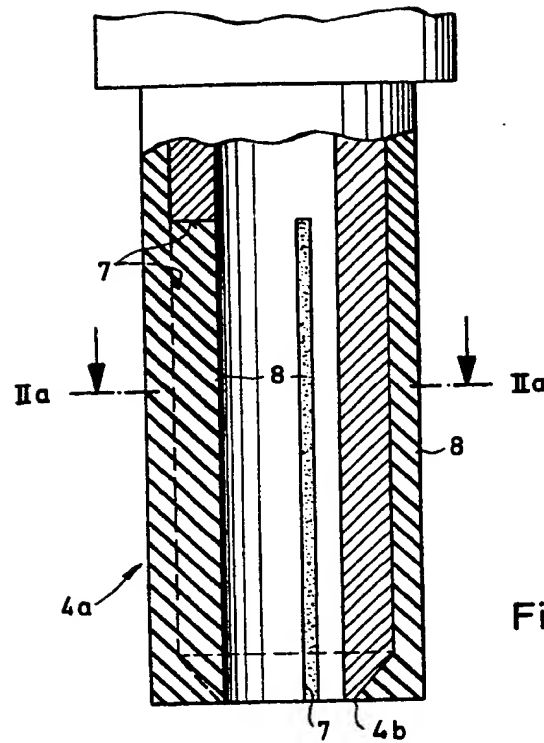


Fig. 2

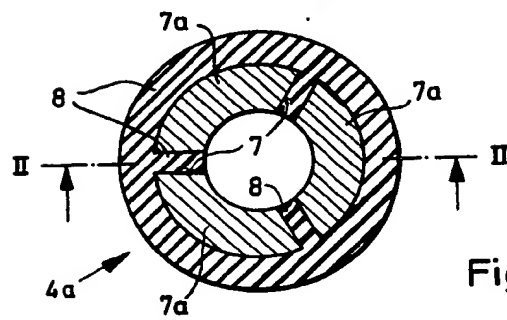


Fig. 2a